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EFFICACY

FILE OR REG. NO. 56228-2

PETITION OR EXP. PERMIT NO.

DATE DIV. RECEIVED 11/28/94

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TYPE PRODUCTS(S): I, D, H, F, N, R, X S

DATA ACCESSION NO(S). 434675-01

PRODUCT MGR. NO. 14

PRODUCT NAME(S) GAS CARTRIDGE

COMPANY NAME Animal and Plant Health Inspection Service (APHIS/USDA)

SUBMISSION PURPOSE support prairie dog claim

CHEMICAL & FORMULATION 10.84% Sulfur, 17.34% Charcoal, 3.25% Red Phosphorus, 43.36% Sodium Nitrate, and 3.52% Sawdust gas cartridge

Efficacy Review: GAS CARTRIDGE, 56228-2
U.S. Department of Agriculture (USDA)
Animal and Plant Health Inspection Service (APHIS)
Hyattsville, MD 20782

200.0 INTRODUCTION

200.1 Uses

A 10.84% Sulphur, 17.34% Charcoal, 3.25% Red Phosphorus, 43.36% Sodium Nitrate, and 3.52% Sawdust gas cartridge Federally registered

"For control of woodchucks, ground squirrels, prairie dogs, and pocket gophers in open fields, non-crop areas, rangelands, reforested areas, lawns, and golf courses."

200.2 Background Information

See efficacy reviews of 9/15/82, 11/16/82, 1/20/83, 7/6/87, 4/27/89, 10/18/89, 3/13/90, 6/24/94, and 1/17/95, along with other information in product jacket. See the Reregistration Eligibility Documents (REDs) issued for gas cartridges (Inorganic Nitrate/Nitrite, and Carbon and Carbon Dioxide). Also see efficacy review of 9/10/92 for 56228-GR ("GAS CARTRIDGE II"), a two-active-ingredient product that was to replace the 56228-2 product, with its five active ingredients (Mineral Oil having been recently administratively declared to be "inert"), at the completion of the reregistration process. Subsequent to the application for 56228-GR, EPA decided to permit APHIS to amend the formulation for 56228-2. Some materials submitted for 5622-GR have been found to be relevant to the proposed revised formulation for 56228-2.

This review discusses a report submitted on 11/23/94 in an effort to support the prairie dog claims that appear on the label of this product.

201.0 DATA SUMMARY

The new formulation of the cartridge would contain only two active ingredients: Sodium Nitrate at 53.0%, and Charcoal at 28.0%. The current formulation contains 5 active ingredients at the nominal concentrations indicated above under "Uses".

The efficacy report submitted for EPA's consideration is identified and discussed below.

Hyngstrom, S.E. (1994) Efficacy of five burrow fumigants for managing black-tailed prairie dogs. Proceedings: 16th Vertebrate Pest Conference, 16, University of California at Davis, 6 pp. (paper supplied in what appears to be manuscript or "galley" form)

MRID# 434675-01

This report presents results of field tests of the current formulation used for 56228-2, a Degesch 55% Aluminum Phosphide tablets product, Meth-O-Gas (100% Methyl Bromide, 5785-11?), Chloropic (96.5% Cloropicrin, 5785-17?), and Brom-O-Gas (98% Methyl Bromide, 2% Chloropicrin, 5785-4?). The last three fumigants all are produced by the Great Lakes Chemical Corporation of West Lafayette, IN, and were reported not to have label claims that would cover the fumigation of prairie dog burrows. (As the result of an EPA Special Review, uses of Methyl Bromide are supposed to be phased out over the next six years or so.)

Hyngstrom directed these efficacy trials on

> "15 typical 2- to 20-ha prairie dog colonies in central Nebraska."

He and four others reportedly used methods authorized by the Nebraska Game and Parks Commission to survey the colonies for the presence of black-footed ferrets (Mustela nigripes), swift foxes (Vulpes velox), burrowing owls (Speotyto cunicularia), and other nontarget species. Hynstrom states that

> "No evidence of ferrets was found and I am confident that we had no impact on nontarget vertebrates."

In context, this statement could mean that other nontargets were found, perhaps including swift foxes and burrowing owls, but that Hyngstrom and associates saw no dead nontargets (or not enough of certain types to matter much on a population level?) and believe (feel?, hope?) that there were no significant adverse impacts on species other than black-tailed prairie dogs.

Among the 15 prairie dog towns involved in this study, Hyngstrom's group "randomly located" and set up 60 "variable-sized plots," each of which contained "50 active prairie dog burrows." Burrows were determined to be active

> "by sign of recent excavation and lack of vegetation, spider webs, and debris in and around the burrows."

Evidently, no pretreatment "closed-hole" censusing was performed.

Within each plot, half of the 50 burrow (openings?) were treated with one of the five products and the other half were left untreated.

The gas cartridges were

> "applied according to label directions by inserting a screwdriver in one end and stirring the contents, inserting a 14-cm fuse into the same end, lighting the fuse, holding the cartridge until the contents ignited, and tossing the cartridge into the burrow, fuse end first. We packed soil into the burrow opening and adjacent burrows to minimize the loss of fumigant from the burrow."

Some of these directions (e.g., "stirring the contents" with a screwdriver, "tossing the cartridge" into burrows) do not currently appear and never have appeared on the label for 56228-2 or 6704-4 (this product's registration number when it belonged to USDI). Neither of these deviations from label directions would be expected to make cartridges kill any better, but both could make their use more hazardous by increasing chances that users would get burned and/or start fires.

The Aluminum Phosphide tablets were applied three/burrow by rolling them through a 1.3-m long PVC pipe, removing the pipe, and plugging the burrow with "crumpled newspaper and packed soil." The Great Lakes fumigants, in 50-lb pressurized cylinders, were hauled to the treatments sites on 3-wheel ATVs, perhaps a risky procedure. Once there, the fumigants were conveyed into the burrows through 15-m polyethylene hosing and a "1-m brass wand with a hand-operated release valve." Soil was packed around the wand prior to gassing to minimize the loss of fumigant while the wand was being withdrawn and the hole closed the rest of the way.

All treated burrows were closed as a necessary component of the fumigation process. The untreated burrows in the same plot also were closed. Burrows were examined for signs of reopening 24 hours after they were closed. Treatment effectiveness was calculated according to the formula

$$100 - \frac{\text{treatment burrows opened}}{\text{control burrows opened}} \times 100.$$

Hyngstrom presents results of treatments as single percent efficacy estimates which, assuming 25 treated burrows per plot, appear to be averages or composites of results on 9-12 plots per treatment. His efficacy and cost (1990 figures) data are presented below.

TREATMENT	BURROWS TREATED	PERCENT CONTROL	COST/HECTARE Materials/Labor	Total
Aluminum Phosphide	250	97%	$37.05/$37.05	$74.10
Gas Cartridge	250	95%	$39.52/$55.58	$95.10
100% Methyl Bromide	300	96%	$9.88/$27.79	$37.67
96.5% Chloropicrin	300	96%	$12.35/$27.79	$40.14
98% MB, 2% Clrpcrn	300	96%	$9.88/$27.79	$37.67

These data suggest that the 5 treatments were equivalent in effectiveness and that the use of gas cartridges was the most costly treatment, followed by Aluminum Phosphide. Not enough details are provided on the efficacy test results to indicate how variable the results might have been or whether there might have been any problems with the data. It appears that the economic data might have been derived rather crudely, as labor costs were reported to be identical for all three Great Lakes fumigants, although the time involved in treating the various plots with each agent almost certainly was not. It also seems unlikely that both the materials and labor costs for Aluminum Phosphide actually would be exactly $37.05/ha. The costs of the 3-wheel ATVs (not used for gas cartridges or Aluminum Phosphide) were not factored into the costs for fumigation with the Great Lakes products. These vehicles would have to have been owned already as further sales of them were banned several years ago in light of an atrocious safety record. The use of ATV's also decreased labor costs because the vehicles helped to decrease the time spent per burrow treated. Plugging burrows was reported to be the most labor-intensive activity involved with use of all five fumigant products.

APHIS contends that Hyngstrom's results should be considered to be applicable to the new two-active-ingredient cartridge, even though it was not tested by Hyngstrom, because

"comparative studies that we have submitted to the agency indicate that the 6-active ingredient cartridge [now five] and the new 2-active ingredient cartridge are comparable in performance for burrowing animals."

I do not believe that the data for the old formulation could possibly be used as proof positive that the new formulation is effective against any given species. If one takes Hyngstrom's data at face value, one can conclude that it is possible to kill black-tailed prairie dogs with a gas cartridge. From this one can infer that sufficient exposure can occur and, therefore, that any cartridge capable of generating at least as much toxic gas as the one found to be effective might also work.

One of the ingredients that was dropped, Red Phosphorous, is capable of killing due to lingering toxicosis several days after gassing and recovery from symptoms cause by other components of the smoke cloud. Because Hyngstrom checked burrows for reopening 24 hours after gassing, it is unlikely that effects due solely to Red Phosphorous were responsible in any significant way for the results that he obtained. Because Hyngstrom did not excavate the burrows that were gassed and checked them only at 24 hours posttreatment, however, it is conceivable that some sublethally poisoned animals counted as dead revived later.

I have located one account of a field trial in which APHIS's old and a formulation closer to that proposed for this cartridge in the future were compared directly. That study was

Dolbeer, R.A., Bernhardt, G.E., Seamans, T.W., and Woronecki, P.P. (1990) Efficacy of two gas cartridge formulations in killing woodchucks in burrows. Unpublished Bird Section Research Report No. 461, Denver Wildlife Research Center (APHIS), Denver, CO, 18 pp.

MRID# 421583-01

This document is discussed in detail in the efficacy review of 1/17/95 for this product and in the efficacy review of 9/10/92 for 56228-GR, a 2-active-ingredient cartridge similar but not identical to the proposed new formulation for 56228-2. The 2-active ingredient cartridge tested was 65% Sodium Nitrate and 35% Charcoal. The basic results of the woodchuck work performed by Dolbeer, et al (1990), are summarized below.

	% Control (all burrows)	% Control (known (known active or excavated)
New Cartridge	86.7%	77.6%
Old Cartridge	92.8%	77.8%

As is explained in some detail in the efficacy reviews referenced in the preceding paragraph, the "all burrows" data refer to the results observed at "all burrow systems that appeared active" even if no woodchucks were seen near them. These burrows were treated and assessed for reopening 3-48 hours later. The "known active or excavated data" refer to those burrow systems which were known to have been occupied at treatment because a woodchuck was seen entering the system and/or from evidence obtained when burrows were excavated. Of these two methods of estimating the effects of treatment, the "all burrows" index was the one most similar to that used by Hyngstrom (1994) in his work with black-tailed prairie dogs in Nebraska. If what happened with Dolbeer, et al's (1990) woodchucks is at all predictive of what happens when prairie dogs are gassed, the control estimates reported by Hyngstrom (1994) might have overstated somewhat the actual effects of all treatments.

From the current and proposed revised labeling for this product and the stipulations in the PDCI tables in the REDs for C & CO_2 and Inorganic Nitrate/Nitrate, it appears that APHIS was required to supply efficacy data on woodchucks and at least one type of ground squirrel in order to maintain registration of this product. As noted in the efficacy review of 1/17/95, APHIS has supplied such data on a formulation related to the currently proposed revised formulation, and also included data on yellow-belly marmots, a species which APHIS has proposed to add as a label claim.

As prairie dog data were not required for reregistration of this product, it is not very important to the future label claims for this product whether I accept Hyngstrom's (1994) data as relevant to 56228-2. What I have decided to do with Hyngstrom's report is to use it only for general support for the notion that it is possible to control prairie dogs with gas cartridges. This conclusion can apply to all cartridges that contain at least 36 g Sodium Nitrate and at least 66 g total of all active ingredients, following a line of reasoning which holds that such cartridges could be expected to produce smoke clouds with

killing powers roughly similar to that produced by the cartridges that were tested.

202.0 CONCLUSIONS

The efficacy report (MRID # 434675-01) by Hyngstrom (1994) does not demonstrate that gas cartridges of the new formulation proposed for this product can effectively control black-tailed prairie dogs because cartridges containing the old formulation are what were tested. What Hyngstrom's data do show (taken at face value due to a lack of detail in his report) is that it was possible to control prairie dogs with a gas cartridge product that contained, nominally, more than 36 g of Sodium Nitrate and more than 66 g of all active ingredients combined. Thus, while it has not been shown that your new formulation will kill prairie dogs effectively, we find that your new formulation would be expected to be capable of controlling prairie dogs due to its composition and net contents. No additional product performance data are needed at this time to support the prairie dog claims made for this product.

William W. Jacobs
Biologist
Insecticide-Rodenticide Branch
January 24, 1995